

CHAPTER 33-20-13 WATER PROTECTION PROVISIONS

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33-20-13-01. Site characterization. The department shall require adequate site characterization to ensure that the waters of the state are not or will not be adversely impacted by the solid waste management facility. At a minimum, the site characterization must address the following:

1. Location and water quality of lakes, rivers, streams, springs, or wetlands within one mile [1.61 kilometers] of the site boundary based on available data;
2. Domestic and livestock wells within one mile [1.61 kilometers] of the site boundary. Information collected should include the location, water quality, depth to water, well depth, screened intervals, yields, and the aquifers tapped;
3. Site location in relation to the one hundred-year floodplain;
4. Depth to the thicknesses of the uppermost aquifers;
5. Hydrologic properties of the uppermost aquifers beneath the proposed facility including existing water quality, flow directions, flow rates, porosity, coefficient of storage, hydraulic conductivity, and potentiometric surface or water table; and
6. An evaluation of the potential for impacts to surface and ground water quality from the proposed facility.

History: Effective December 1, 1992; amended effective October 1, 1994.

General Authority: NDCC 23-29-04

Law Implemented: NDCC 23-29-04, 23-29-07.6

33-20-13-02. Ground water quality monitoring.

1. An owner or operator of a resource recovery unit, a land treatment unit, a surface impoundment, or a landfill, except an inert waste landfill, must incorporate a ground water monitoring system into the design of the facility. If the owner or operator demonstrates to the department that there is no potential for migration of solid waste constituents to the uppermost aquifer during the life of the solid waste

management unit and the postclosure period, the department may suspend this requirement. The demonstration must be based upon factors such as the site characterization, the solid waste characteristics and constituents, the potential capacity of the unit or facility, and the physical, chemical, and biological processes affecting contaminant fate and transport.

2. Ground water monitoring systems must be designed to effectively detect the migration of contamination. At a minimum, a water quality monitoring system shall:
 - a. Include one ground water monitoring well located upgradient of the solid waste management unit, and at least two wells located downgradient of the unit. The monitoring wells should be installed at appropriate locations and depths to yield ground water from the uppermost aquifer and all hydraulically connected aquifers below the solid waste management units on the facility;
 - b. Represent the elevation of ground water in each well immediately prior to purging so that the owner or operator may determine the rate and direction of ground water flow each time ground water is sampled;
 - c. Represent the quality of ground water that has not been affected by spills or leakage from solid waste management units;
 - d. Represent the quality of ground water to ensure detection of contamination passing the compliance boundary;
 - e. Ground water samples at municipal waste landfills must not be filtered prior to analysis; and
 - f. The frequency and number of samples collected must be consistent with statistical procedures for evaluating ground water data. A minimum of four independent samples from each well must be collected for analysis during the first sampling event for establishing background data at upgradient (subdivision c) and downgradient (subdivision d) wells, unless four or more sampling events occur prior to acceptance of solid waste by the facility. The monitoring frequency must be semiannual during the active life of the facility and during the postclosure period. The department may specify an alternate frequency for sampling based upon such factors as site hydrogeological characteristics, solid waste characteristics, evidence of a spill or leakage, or resource value of the aquifer.
3. Additional wells may be required in complicated hydrogeological settings or to define the extent of contamination detected.

4. A written ground water monitoring plan must be developed for approval by the department and implemented as part of the permitting process. The plan must include:
 - a. Number and location of wells;
 - b. Procedures for decontamination of drilling and sampling equipment;
 - c. Procedures for sample collection;
 - d. Sample analytical procedures;
 - e. Chain of custody control;
 - f. Parameters for analysis;
 - g. Quality assurance or quality control procedures;
 - h. A monitoring schedule;
 - i. Data statistical methods and analysis procedures; and
 - j. Reporting of a statistically significant increase over a background value or of an exceedance of a maximum concentration limit or a water quality standard.
5. Ground water monitoring data obtained under this section must be analyzed within a reasonable period of time after completing sampling and laboratory analysis to determine whether or not a statistically significant increase over background values or an exceedance of a maximum concentration limit or water quality standard has occurred for each parameter required in the monitoring plan or permit. Statistical methods must, as appropriate:
 - a. Be appropriate for the distribution of the data and, if inappropriate for a normal theory test, be transformed or a distribution-free theory test must be used.
 - b. Control or correct for seasonal and spatial variability in the data.
 - c. Account for data below the limit of detection that can be reliably achieved by routine laboratory techniques, using the limit as the lowest concentration level for a chemical parameter which is below detection.

- d. Be protective of human health and environmental resources.

History: Effective December 1, 1992; amended effective October 1, 1994; August 1, 1995.

General Authority: NDCC 23-29-04, 23-33-05, 23-33-11, 61-28-04, 61-28-05

Law Implemented: NDCC 23-29-04, 23-33-05, 23-33-06, 23-33-08, 23-33-11, 61-28-04

33-20-13-03. Water quality standards.

1. All solid waste management systems, operations, units, and facilities must be designed, constructed, operated, maintained, closed, and maintained after closure so as to be in compliance with North Dakota Century Code chapter 61-28, and water quality standards defined in articles 33-16 and 33-17. Compliance with these standards is enforceable at the compliance boundary of the facility.
2. Whenever ground water monitoring is required, the department must specify in the facility permit the specific elements of ground water monitoring, including indicator parameters which are constituents in or derived from solid waste, the maximum concentration limits in ground water for each parameter not otherwise defined by subsection 1, and the compliance boundary, considering:
 - a. The physical and chemical characteristics of the waste, including the potential for migration in surface water, in the unsaturated zone beneath the facility, and in ground water;
 - b. The hydrogeological characteristics of the site and the surrounding land;
 - c. The existing quality and quantity of ground water, other possible sources of contamination, and the direction of ground water flow;
 - d. The detectability of the indicator parameters or constituents in surface water or in ground water; or
 - e. The proximity of the facility to surface waters; and
 - f. Appropriate parameters from the list in table 1.
3. The compliance boundary shall be located on land owned by the owner of the facility and no more than five hundred feet [152.4 meters] from a landfill or landfill disposal cell.

TABLE 1 List of Parameters for Assessing Ground Water Quality

a. Parameters measured in the field:

- (1) Appearance (including color, foaming, and odor)
- (2) pH¹
- (3) Specific conductance²
- (4) Temperature
- (5) Water elevation³

b. General geochemical parameters:

- | | |
|----------------------|-----------------------------------|
| (1) Amonia nitrogen | (11) Chloride |
| (2) Total hardness | (12) Floride |
| (3) Iron | (13) Nitrate + Nitrite, as N |
| (4) Calcium | (14) Total phosphorus |
| (5) Magnesium | (15) Sulfate |
| (6) Manganese | (16) Sodium |
| (7) Potassium | (17) Total dissolved solids (TDS) |
| (8) Total alkalinity | (18) Total suspended solids (TSS) |
| (9) Bicarbonate | (19) Cation/anion balance |
| (10) Carbonate | |

c. Heavy metals:

Group A:

- (1) Arsenic
- (2) Barium
- (3) Cadmium
- (4) Chromium
- (5) Lead
- (6) Mercury
- (7) Selenium
- (8) Silver

Group B:

- (9) Antimony
- (10) Beryllium
- (11) Cobalt
- (12) Copper
- (13) Nickel
- (14) Thallium
- (15) Vanadium
- (16) Zinc

d. Total organic carbon (TOC)
Chemical oxygen demand (COD)

e. Naturally occurring radionuclides:

- (1) Radon
- (2) Radium
- (3) Uranium

f. Volatile organic compounds, both halogenated and nonhalogenated:

Halogenated:

- | | |
|----------------------|--------------------------------------|
| Acrylonitrile | 1,1-Dichloroethylene |
| Allyl chloride | 1,2-Dichloropropane |
| Bromochloromethane | cis-1,3-Dichloropropene |
| Bromodichloromethane | cis-1,2-Dichloroethylene |
| Bromoform | trans-1,2-Dichloroethylene |
| Bromomethane | trans-1,3-Dichloropropene |
| Carbon disulfide | trans-1,4-Dichloro-2-butene |
| Carbon tetrachloride | Dichlorofluoromethane |
| Chlorobenzene | Dichloromethane (methylene chloride) |
| (monochlorobenzene) | 1,3-Dichloropropene |

Chlorodibromomethane	2,3-Dichloro-1-propene
Chloroethane	Pentachloroethane
Chloroform	1,1,1,2-Tetrachloroethane
Chloromethane	1,1,2,2-Tetrachloroethane
Dibromomethane	Tetrachloroethylene
1,2-Dibromo-3-chloropropane	1,1,1-Trichloroethane
1,2-Dibromoethane	1,1,2-Trichloroethane
Dichloroacetoneitrile	Trichloroethylene
1,2-Dichlorobenzene	Trichlorofluoromethane
1,3-Dichlorobenzene	1,2,3-Trichloropropane
1,4-Dichlorobenzene	1,1,2-Trichlorotrifluoroethane
Dichlorodifluoromethane	Vinyl acetate
1,1-Dichloroethane	Vinyl chloride
1,2-Dichloroethane	

Nonhalogenated:

Acetone	Methyl isobutyl ketone
Benzene	Pyrene
Cumene	Styrene
Ethylbenzene	Tetrahydrofuran
Ethyl ether	Toluene
Methyl butyl ketone	m-Xylene
Methyl ethyl ketone	o-Xylene
Methyl iodide	p-Xylene

g. Pesticides:

Aldrin	Endrin
Chlordane	Heptachlor
Chloroform	Lindane
4,4 DDT	Methyl bromide
Dibenzofuran	Methyl Methacrylate
Dieldrin	Methylene bromide
Dimethoate	Naphthalene
Endosulfan	Parathion

¹ Two measurements: in field, and immediately upon sample's arrival in laboratory.

² As measured in field.

³ As measured to the nearest 0.01 foot in field before pumping or bailing.

History: Effective December 1, 1992; amended effective October 1, 1994.

General Authority: NDCC 23-29-04, 23-33-05, 23-33-11, 61-28-04, 61-28-05

Law Implemented: NDCC 23-29-04, 23-33-05, 23-33-06, 23-33-08, 23-33-11, 61-28-04

33-20-13-04. Monitoring well construction.

1. All monitoring wells must be cased in a manner that maintains the integrity of the monitoring well bore hole. This casing must allow collection of representative ground water samples. Wells must be

constructed in such a manner as to prevent contamination of the samples, the sampled strata, and between aquifers and water bearing strata.

2. All soil borings or ground water monitoring wells must be completed by a driller licensed in North Dakota and must meet design and construction requirements as stipulated in North Dakota Century Code chapter 43-35 and article 33-18.

History: Effective December 1, 1992.

General Authority: NDCC 23-29-04, 43-35-19, 43-35-19.1, 43-35-19.2

Law Implemented: NDCC 23-29-04, 43-35-19, 43-35-19.1, 43-35-19.2

33-20-13-05. Assessment monitoring, remedial measures, and corrective action.

1. Within ninety days of finding that a parameter has been detected at a statistically significant level exceeding the ground water standards established under sections 33-20-13-02 and 33-20-13-03, the owner or operator shall initiate an assessment of remedial measures. The assessment must:

- a. Be completed within a reasonable time period, unless otherwise specified by permit or the department;
- b. Include an evaluation of the nature and extent of the release of the constituents including pathways to human and environmental receptors;
- c. For municipal landfills, include ground water sampling and analysis for all parameters listed in appendix 1 of this chapter. The department may delete any of the appendix 1 parameters if it can be shown that the removed constituents are not reasonably expected to be in or derived from the waste within the leaking facility;
- d. Include an analysis of the effectiveness of potential remedial measures in meeting all requirements of subsection 2 and include the following:
 - (1) The performance, reliability, ease of implementation, and potential impacts of each potential remedial measure;
 - (2) The time required to begin and complete each potential remedial measure;
 - (3) The costs of implementation of each potential remedial measure; and

- (4) The permit requirements or other environmental or public health requirements that may substantially affect implementation of each potential remedial measure; and
 - e. When requested by the department, the owner or operator must discuss results of the assessment of remedial measures, prior to selection of a corrective action remedy, in a public meeting with interested and affected persons.
- 2. Based on the results of the assessment of remedial measures conducted under subsection 1, the owner or operator must select a corrective action remedy within thirty days which, at minimum, meets the following standards:
 - a. Is protective of human health and environmental resources;
 - b. Attains the ground water protection standards under sections 33-20-13-02 and 33-20-13-03;
 - c. Controls the sources of release so as to reduce or eliminate, to the maximum extent practicable, further releases of constituents that may pose a threat to human health or environmental resources; and
 - d. Complies with this article and other applicable environmental statutes and rules.
- 3. When selecting a corrective action remedy under subsection 2, the owner or operator shall consider these factors:
 - a. The short-term and long-term effectiveness of the potential remedial measure considering:
 - (1) Magnitude of reducing exposure to constituents;
 - (2) Likelihood of further releases;
 - (3) Practical capability of technologies; and
 - (4) Time until the standards are achieved.
 - b. The ease or difficulty of implementing the potential remedial measure considering:
 - (1) Availability of equipment and specialists;
 - (2) Long-term management needs such as monitoring, operation, and maintenance;and

- (3) Need to coordinate with and obtain necessary approvals or permits from other agencies.
- c. The need for interim measures to control the sources of the release and to protect human health and environmental resources.
- d. The schedules for initiating, conducting, and completing the potential remedial measure.
- e. Practical capability of the owner or operator.
- 4. The owner or operator shall provide the department with a document fully describing the remedial measures assessment under subsection 1 and the selected corrective action remedy under subsections 2 and 3.
- 5. Upon selection of the corrective action remedy under subsection 2 and with the concurrence of the department, the owner or operator shall establish and implement the remedy.
 - a. During implementation, the owner or operator shall monitor the effectiveness of the remedy.
 - b. Implementation shall be considered complete when all actions and standards required to complete the remedy have been satisfied and approved by the department.
 - c. Upon completion of a corrective action remedy, the owner or operator shall place in the operating record a certification that the corrective action remedy has been completed. Within fourteen days of completion of the certification, the owner or operator shall notify the department that the certification has been placed in the operating record.

History: Effective October 1, 1994; amended effective August 1, 1995.

General Authority: NDCC 23-29-04, 23-33-11, 61-28-04, 61-28-05

Law Implemented: NDCC 23-29-04, 23-33-02, 23-33-06, 23-33-08, 61-28-04

Appendix I to Section 33-20-13-05 - List of Hazardous
Inorganic and Organic Constituents

Acenaphthene	p-Chloroaniline
Acenaphtylene	Chlorobenzene
Acetone	Chlorobenzilate
Acetonitrile; Methyl cyanide	p-Chloro-m-cresol; 4-Chloro-3-
Acetophenone	methylphenol
2-Acetylaminofluorene; 2-AAF	Chloroethane; Ethyl chloride
Acrolein	Chloroform; Trichloromethane
Acrylonitrile	2-Chloronaphthalene
Aldrin	2-Chlorophenol
Allyl chloride	4-Chlorophenyl phenyl ether
4-Aminobiphenyl	Chloroprene
Anthracene	Chromium
Antimony	Chrysene
Arsenic	Cobalt
Barium	Copper
Benzene	m-Cresol; 3-methylphenol
Benzol[a]anthracene; Benzanthracene	o-Cresol; 2-Methylphenol
Benzo[b]fluoranthene	p-Cresol; 4-Methylphenol
Benzo[k]fluoranthene	Cyanide
Benzo[ghi]perylene	2,4-D; 2,4-Dichlorophenoxyacetic
Benzo[a]pyrene	acid
Benzyl alcohol	4,4 ¹ -DDD
Beryllium	4,4 ¹ -DDE
alpha-BHC	4,4 ¹ -DDT
beta-BHC	Diallate
delta-BHC	Dibenz[a,h]anthracene
gamma-BHC; Lindane	Dibenzofuran
Bis(2-chloroethoxy)methane	Dibromochloromethane;
Bis(2-chloroethyl)ether;	Chlorodibromomethane
Dichloroethyl ether	1,2-Dibromo-3-chloropropane; DBCP
Bis-(2-chloro-1-methylethyl) ether;	1,2-Dibromoethane; Ethylene
2,2 ¹ -Dichlorodiisopropyl	dibromide; EDB
ether; DCIP	Di-n-butyl phthalate
Bis-(2-ethylhexyl) phthalate	o-Dichlorobenzene;
Bromochloromethane; Chloro-	1,2-Dichlorobenzene
bromomethane	m-Dichlorobenzene;
Bromodichloromethane;	1,3-Dichlorobenzene
Dibromochloromethane	p-Dichlorobenzene;
Bromoform; Tribromomethane	1,4-Dichlorobenzene
4-Bromophenyl phenyl ether	3,3 ¹ -Dichlorobenzidine
Butyl benzyl phthalate; Benzyl	trans-1,4-Dichloro-2-butene
butyl phthalate	Dichlorodifluoromethane; CFC 12
Cadmium	1,1-Dichloroethane; Ethyldidene
Carbon disulfide	chloride
Carbon tetrachloride	1,2-Dichloroethane; Ethylene
Chlordane	dichloride
1,1-Dichloroethylene; 1,1-Dichloro-	Hexachlorocyclopentadiene
ethene; Vinylidene chloride	Hexachloroethane
cis-1,2-Dichloroethylene; cis-1,2-	Hexachloropropene
Dichloroethene	2-Hexanone; Methyl butyl ketone
trans-1,2-Dichloroethylene trans-1,2-	Indeno(1,2,3-cd)pyrene
Dichloroethene	Isobutyl alcohol
2,4-Dichlorophenol	Isodrin
2,6-Dichlorophenol	Isophorone
1,2-Dichloropropane; Propylene	Isosafrole
dichloride	Kepone

1,3-Dichloropropane; Trimethylene dichloride	Lead
2,2-Dichloropropane; Isopropylidene chloride	Mercury
1,1-Dichloropropene	Methacrylonitrile
cis-1,3-Dichloropropene	Methapyrilene
trans-1,3-Dichloropropene	Methoxychlor
Dieldrin	Methyl bromide; Bromomethane
Diethyl phthalate	Methyl chloride; Chloromethane
0,0-Diethyl 0-2-pyrazinyl phosphorothioate; Thionazin	3-Methylcholanthrene
Dimethoate	Methyl ethyl ketone; MEK; 2-Butanone
p-(Dimethylamino)azobenzene	Methyl iodide; Iodomethane
7,12-Dimethylbenz[a]anthracene	Methyl methacrylate
3,3 ¹ -Dimethylbenzidine	Methyl methanesulfonate
2,4-Dimethylphenol; m-Xylenol	2-Methylnaphthalene
Dimethyl phthalate	Methyl parathion; Parathion methyl
m-Dinitrobenzene	4-Methyl-2-pentanone; Methyl isobutyl ketone
4,6-Dinitro-o-cresol 4,6-Dinitro-2 methylphenol	Methylene bromide; Dibromomethane
2,4-Dinitrophenol	Methylene chloride; Dichloromethane
2,4-Dinitrotoluene	Naphthalene
2,6-Dinitrotoluene	1,4-Naphthoquinone
Dinoseb; DNBP; 2-sec-Butyl-4,6-dinitrophenol	1-Naphthylamine
Di-n-octyl phthalate	2-Naphthylamine
Diphenylamine	Nickel
Disulfoton	o-Nitroaniline; 2-Nitroaniline
Endosulfan I	m-Nitroaniline; 3-Nitroaniline
Endosulfan II	p-nitroaniline; 4-Nitroaniline
Endosulfan sulfate	Nitrobenzene
Endrin	o-Nitrophenol; 2-Nitrophenol
Endrin aldehyde	p-Nitrophenol; 4-Nitrophenol
Ethylbenzene	N-Nitrosodi-n-butylamine
Ethyl methacrylate	N-Nitrosodiethylamine
Ethyl methanesulfonate	N-Nitrosodimethylamine
Famphur	N-Nitrosodiphenylamine
Fluoranthene	N-Nitrosodipropylamine; N-Nitroso-N-dipropylamine; Di-n-propyl nitrosamine
Fluorene	N-Nitrosomethylethylamine
Heptachlor	N-Nitrosopiperidine
Heptachlor epoxide	N-Nitrosopyrrolidine
Hexachlorobenzene	5-Nitro-o-toluidine
Hexachlorobutadiene	Parathion
Pentachloronitrobenzene	Pentachlorobenzene
Pentachlorophenol	
Phenacetin	2,3,4,6-Tetrachlorophenol
Phenanthrene	Thallium
Phenol	Tin
p-Phenylenediamine	Toluene
Phorate	o-Toluidine
Polychlorinated biphenyls; PCBs; Aroclors	Toxaphene
Pronamide	1,2,4-Trichlorobenzene
Propionitrile; Ethyl cyanide	1,1,1-Trichloroethane; Methylchloroform
Pyrene	1,1,2-Trichloroethane
Safrole	Trichloroethylene; Trichloroethene
Selenium	Trichlorofluoromethane; CFC-11
Silver	2,4,5-Trichlorophenol
Silvex; 2,4,5-TP	2,4,6-Trichlorophenol
	1,2,3-Trichloropropane
	0,0,0-Triethyl phosphorothioate

Styrene	sym-Trinitrobenzene
Sulfide	Vanadium
2,4,5-T; 2,4,5-Trichlorophen- oxyacetic acid	Vinyl acetate
1,2,4,5-Tetrachlorobenzene	Vinyl chloride; Chloroethene
1,1,1,2-Tetrachloroethane	Xylene (total)
1,1,2,2-Tetrachloroethane	Zinc
Tetrachloroethylene; Tetrachloroethene; Perchloroethylene	

History: Effective August 1, 1995.